

Envelope Summary

Climate Zone 1

ENV-SUM

2003 Washington State Energy Code Compliance Forms

Revised June 2002 KJM

Project Info	Project Address	Date
		For Building Department Use
	Applicant Name:	
	Applicant Address:	
	Applicant Phone:	

Project Description	<input type="checkbox"/> New Building	<input type="checkbox"/> Addition	<input type="checkbox"/> Alteration	<input type="checkbox"/> Change of Use
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Compliance Option	<input type="checkbox"/> Prescriptive <input type="checkbox"/> Component Performance (See Decision Flowchart (over) for qualifications)	<input type="checkbox"/> ENVSTD 2.1 (4.0 not acceptable)	<input type="checkbox"/> Systems Analysis

Space Heat Type	<input type="radio"/> Electric resistance <input type="radio"/> All other (see over for definitions)
Glazing Area Calculation Note: Below grade walls may be included in the Gross Exterior Wall Area if they are insulated to the level required for opaque walls.	Total Glazing Area (rough opening) (vertical & overhd) <div>Electronic version: these values are automatically taken from ENV-UA-1.</div> Gross Exterior Wall Area <div>divided by</div> times 100 equals % Glazing
	<div style="text-align: center;"> $\times 100 =$ </div>
Concrete/Masonry Option	<input type="radio"/> yes <input type="radio"/> no <div>Check here if using this option and if project meets all requirements for the Concrete/Masonry Option. See Decision Flowchart (over) for qualifications. Enter requirements for each qualifying assembly below.</div>

Envelope Requirements (enter values as applicable)	
Fully heated/cooled space	
<i>Minimum Insulation R-values</i>	
Roofs Over Attic	
All Other Roofs	
Opaque Walls ¹	
Below Grade Walls	
Floors Over Unconditioned Space	
Slabs-on-Grade	
Radiant Floors	
<i>Maximum U-factors</i>	
Opaque Doors	
Vertical Glazing	
Overhead Glazing	
<i>Maximum SHGC (or SC)</i>	
Vertical/Overhead Glazing	

Semi-heated space ²	
Minimum Insulation R-values	
Roofs Over Semi-Heated Spaces ²	

1. Assemblies with metal framing must comply with overall U-factors

2. Refer to Section 1310 for qualifications and requirements

[illegible]

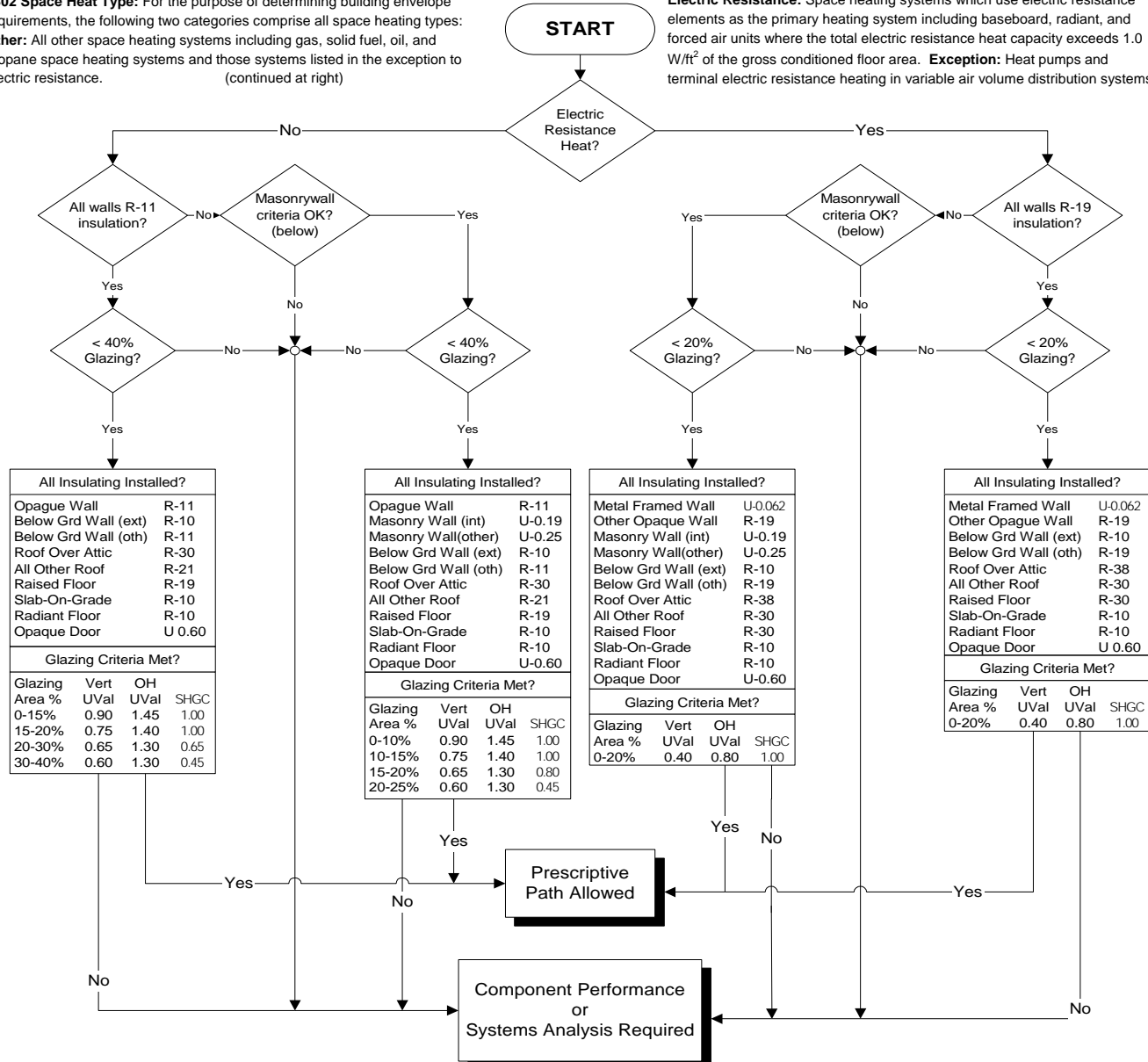
Notes:

Decision Flowchart for Prescriptive Option

Use this flowchart to determine if project qualifies for the optional Prescriptive Option.
If not, either the Component Performance or Systems Analysis Options must be used.

1302 Space Heat Type: For the purpose of determining building envelope requirements, the following two categories comprise all space heating types:
Other: All other space heating systems including gas, solid fuel, oil, and propane space heating systems and those systems listed in the exception to electric resistance.
(continued at right)

Electric Resistance: Space heating systems which use electric resistance elements as the primary heating system including baseboard, radiant, and forced air units where the total electric resistance heat capacity exceeds 1.0 W/ft² of the gross conditioned floor area. **Exception:** Heat pumps and terminal electric resistance heating in variable air volume distribution systems.



Concrete/Masonry Option*	Wall Heat Capacity (HC)			
Assembly Description	Assy.Tag	HC**	Area (sf)	HC x Area
Totals				
Area weighted HC: divide total of (HC x area) by Total Area				

*If the area weighted heat capacity (HC) of the total above grade wall is a minimum of 9.0, the Concrete Masonry Option may be used.
**For framed walls, assume HC=1.0 unless calculations are provided; for all other walls, use Section 1009.

Envelope UA Calculations

Climate Zone1

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Project Address				Date			
Space Heat Type		<input type="radio"/> Electric resistance <input type="radio"/> All other		For Building Department Use			
Glazing Area as % gross exterior wall area		Prop. Max.Target					
Concrete/Masonry Option		<input type="radio"/> Yes <input type="radio"/> No					
Notes: If glazing area exceeds maximum allowed in Table, then calculate adjusted areas on back (over). If Concrete/Masonry Option is used, Target U-factors, SHGC and Glazing % will be different than shown below. Refer to Table 13-1 for correct values.							
Building Component		Proposed UA			Target UA		
List components by assembly ID & page #		U-factor	x Area (A)	= UA (U x A)	U-factor	x Area (A)	= UA (U x A)
Vertical Glazing	U= Plan ID:						
	U= Plan ID:				Glazing %	Electric Resist.	Other Heating
	U= Plan ID:				0-15%	0.40	0.90
	U= Plan ID:				>15-20%	0.40	0.75
	U= Plan ID:				>20-30%	see note above	0.60
	U= Plan ID:				>30-40%	see note above	0.50
	U= Plan ID:				(see Table 13-1 for Conc/Masonry values)		
Overhead Glazing	U= Plan ID:						
	U= Plan ID:				Glazing %	Electric Resist.	Other Heating
	U= Plan ID:				0-15%	0.80	1.45
	U= Plan ID:				>15-20%	0.80	1.40
	U= Plan ID:				>20-30%	see note above	1.30
	U= Plan ID:				>30-40%	see note above	1.25
	U= Plan ID:				(see Table 13-1 for Conc/Masonry values)		
Opaque Doors	U= Plan ID:						
	U= Plan ID:					Electric Resist.	Other Heating
	U= Plan ID:					0.60	0.60
Roofs Over Attics	R= Plan ID:						
	R= Plan ID:					Electric Resist.	Other Heating
	R= Plan ID:					0.031	0.036
Other Roofs	R= Plan ID:						
	R= Plan ID:					Electric Resist.	Other Heating
	R= Plan ID:					0.034	0.050
Opaque Walls*	R= Plan ID:				**		
	R= Plan ID:				**		
	R= Plan ID:				**		
	R= Plan ID:					Electric Resist.	Other Heating
	R= Plan ID:				Ordinary	0.062	0.14
	R= Plan ID:				Conc(int)	0.19	0.19
	R= Plan ID:				Conc(oth)	0.25	0.25
**Note: sum of Target Areas here should equal Target Opaque Wall Area (see back)							
Below Grade Walls	R= Plan ID:						
	R= Plan ID:					Electric Resist.	Other Heating
	R= Plan ID:					0.062	0.14
Note: if insulated to levels required for opaque walls, list above with opaque walls							
Roofs Over Uncond. Sp.	R= Plan ID:						
	R= Plan ID:					Electric Resist.	Other Heating
	R= Plan ID:					0.029	0.056
	R= Plan ID:						
Sub-slab grade Radiant	R= Plan ID:						
	R= Plan ID:					Electric Resist.	Other Heating
	R= Plan ID:					F=0.54	F=0.54
	R= Plan ID:				(see Table 13-1 for radiant floor values)		
Totals					Totals		

*For CMU walls, indicate core insulation material.

For compliance:

1) Proposed Total Area shall equal Target Total Area, and 2) Proposed Total UA shall not exceed Target Total UA.

Glazing		Proposed SHGC		Target SHGC			
List components by assembly ID & page #		SHGC*	x Area (A)	= SHGC x A	SHGC	x Area (A)	= SHGC x A
Glazing	ID:				Glazing %	Electric Resist.	Other Heating
	ID:				0-20%	1.00	1.00
	ID:				>20-30%	not allowed	0.65
	ID:				>30-40%	not allowed	0.45
	ID:				(see Table 13-1 for Conc/Masonry values)		
Totals					Totals		

*Note: Manufacturer's SC may be used in lieu of SHGC.

For compliance: Proposed total SHGC x A shall not exceed Target total SHGC x A

NOTE: Since 1997 SHGC compliance for vertical and overhead glazing is allowed to be calculated together.

Target Area Adjustment Calculations

If the total amount of glazing area as a % of gross exterior wall area (calculated on ENV-SUM1) exceeds the maximum allowed in Table 13-1, then this calculation must be submitted. Use the resulting areas in the Target UA and SHGC calculations above.

Proposed Areas: Numbered values are used in calculations below.

	Roofs over Attics	Other Roofs	Walls
Glazing Area	OG=	OG=	VG=
Opaque Area			

Gross Exterior Wall Area X Max Glazing Area (Table 13-1) ÷ 100 = Maximum Target Glazing Area

Target OG Area in Roofs over Attics - (lesser) = Max OG Remaining - Target OG Area in Other Roofs (lesser) = Target VG Area

Proposed Opaque Area + Proposed OG Area - Target OG Area = Target Opaque Area

Walls + Proposed VG Area - Target VG Area = Target Opaque Area

Target Areas OK

Note:
OG = overhead glazing
VG = vertical glazing

For Target OG's, the lesser values are used both here and below.

Note: If there is more than one type of wall, the Target VG Area may be distributed among them, and separate Target Opaque Areas found.

If the Target Areas for Opaque Walls listed on the front must equal the total calculated here.

Target values in shaded boxes are used in the applicable Target UA calculations on the front.
Target VG Area and Total Target OG Area are also used in the applicable Target SHGC calculations above.

Building Permit Plans Checklist**ENV-CHK**

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Project Address				Date	
The following information is necessary to check a building permit application for compliance with the building envelope requirements in the Washington State Nonresidential Energy Code.					
Applicability (yes, no, n.a.)	Code Section	Component	Information Required	Location on Plans	Building Department Notes
GENERAL REQUIREMENTS (Sections 1301-1314)					
	1301	Scope	Unconditioned spaces identified on plans if allowed		
	1302	Space heat type:	If "Other", indicate on plans that electric resistance heat is not allowed		
	1310.2	Semi-heated spaces	Semi-heated spaces identified on plans if allowed		
	1311	Insulation			
	1311.1	Insul. installation	Indicate densities and clearances		
	1311.2	Roof /ceiling insul.	Indicate R-value on roof sections for attics and other roofs; Indicate clearances for attic insulation; Indicate baffles if eave vents installed; Indicate face stapling of faced batts		
	1311.3	Wall insulation	Indicate R-value on wall sections; Indicate face stapling of faced batts; Indicate above grade exterior insulation is protected; Indicate loose-fill core insulation for masonry walls as necess; Indicate heat capacity of masonry walls if masonry option is used or if credit taken in ENVSTD;		
	1311.4	Floor insulation	Indicate R-value on floor sections; Indicate substantial contact with surface; Indicate supports not more than 24" o.c.; Indicate that insulation does not block airflow through foundation vents		
	1311.5	Slab-on-grade floor	Indicate R-value on wall section or foundation detail; Indicate slab insulation extends down vertically 24" from top; Indicate above grade exterior insulation is protected		
	1311.6	Radiant floor	Indicate R-value on wall section or foundation detail; Indicate slab insulation extends down vertically 36" from the top; Indicate above grade exterior insulation is protected; Indicate insulation also under entire slab where req'd. by Official		
	1312	Glazing and doors	Provide calculation of glazing area (including both vertical vertical and overhead) as percent of gross wall area		
	1312.1	U-factors	Indicate glazing and door U-factors on glazing and door schedule (provide area-weighted calculations as necessary); Indicate if values are NFRC or default, if values are default then specify frame type, glazing layers, gapwidth, low-e coatings, gas fillings		
	1312.2	SHGC & SC	Indicate glazing solar heat gain coefficient or shading coefficient on glazing schedule (provide area-weighted calculations as necessary)		
	1313	Moisture control			
	1313.1	Vapor retarders	Indicate vapor retarders on warm side		
	1313.2	Roof/ceiling vap.ret.	Indicate vapor retarder on roof section; Indicate vap. retard. with sealed seams for non-wood struc.		
	1313.3	Wall vapor retarder	Indicate vapor retarder on wall section		
	1313.4	Floor vapor retarder	Indicate vapor retarder on floor section		
	1313.5	Crawl space vap. ret.	Indicate six mil black polyethylene overlapped 12" on ground		
	1314	Air leakage			
	1314.1	Bldg. envel. sealing	Indicate sealing, caulking, gasketing, and weatherstripping		
	1314.2	Glazing/door sealing	Indicate weatherstripping		
	1314.3	Assemb. as ducts	Indicate sealing, caulking and gasketing		
PRESCRIPTIVE/COMPONENT PERFORMANCE (Sections 1320-23 or 1330-34)					
		Envelope Sum. Form	Completed and attached. Provide component performance worksheet if necessary Provide ENVSTD 2.1 screen 1 output if necessary		

If "no" is shown for any question, provide explanation:

Building Permit Plans Checklist**ENV-CHK**

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Envelope - General Requirements**1311 Insulation**

1311.1 Installation Requirements: All insulation materials shall be installed according to the manufacturer's instructions to achieve proper densities, maintain clearances, and maintain uniform R-values. To the maximum extent possible, insulation shall extend over the full component area to the intended R-value.

1311.2 Roof/Ceiling Insulation: Open-blown or poured loose-fill insulation may be used in attic spaces where the slope of the ceiling is not more than 3/12 and there is at least thirty inches of clear distance from the top of the bottom chord of the truss or ceiling joist to the underside of the sheathing at the roof ridge. When eave vents are installed, baffling of the vent openings shall be provided so as to deflect the incoming air above the surface of the insulation.

Where lighting fixtures are recessed into a suspended or exposed grid ceiling, the roof/ceiling assembly shall be insulated in a location other than directly on the suspended ceiling.

Exception: Type IC rated recessed lighting fixtures.

Where installed in wood framing, faced batt insulation shall be face stapled.

1311.3 Wall Insulation: Exterior wall cavities isolated during framing shall be fully insulated to the levels of the surrounding walls. When installed in wood framing, faced batt insulation shall be face stapled.

Above grade exterior insulation shall be protected.

1311.4 Floor Insulation: Floor insulation shall be installed in a permanent manner in substantial contact with the surface being insulated. Insulation supports shall be installed so spacing is not more than twenty-four inches on center. Installed insulation shall not block the airflow through foundation vents.

1311.5 Slab-On-Grade Floor: Slab-on-grade insulation installed inside the foundation wall shall extend downward from the top of the slab a minimum distance of twenty-four inches or to the top of the footing, whichever is less. Insulation installed outside the foundation shall extend downward a minimum of twenty-four inches or to the frostline, whichever is greater. Above grade insulation shall be protected.

Exception: For monolithic slabs, the insulation shall extend downward from the top of the slab to the bottom of the footing.

1311.6 Radiant Floors (on or below grade): Slab-on-grade insulation shall extend downward from the top of the slab a minimum distance of thirty-six inches or downward to the top of the footing and horizontal for an aggregate of not less than thirty-six inches.

If required by the building official where soil conditions warrant such insulation, the entire area of a radiant floor shall be thermally isolated from the soil. Where a soil gas control system is provided below the radiant floor, which results in increased convective flow below the radiant floor, the radiant floor shall be thermally isolated from the sub-floor gravel layer.

1312 Glazing and Doors

1312.1 Standard Procedure for Determination of Glazing and Door U-Factors: U-factors for glazing and doors shall be determined, certified and labeled in accordance with Standard RS-31 by a certified independent agency licensed by the National Fenestration Rating Council (NFRC). Compliance shall be based on the Residential or the Nonresidential Model Size.

Product samples used for U-factor determinations shall be production line units or representative of units as purchased by the consumer or contractor. Unlabeled glazing and doors shall be assigned the default U-factor in Section 2006.

1312.2 Solar Heat Gain Coefficient and Shading

Coefficient: Solar Heat Gain Coefficient (SHGC), shall be determined, certified and labeled in accordance with the National Fenestration Rating Council (NFRC) Standard by a certified, independent agency, licensed by the NFRC.

Exception: Shading coefficients (SC) shall be an acceptable alternate for compliance with solar heat gain coefficient requirements. Shading coefficients for glazing shall be taken from Chapter 27 of Standard RS-27 or from the manufacturer's test data.

1313 Moisture Control

1313.1 Vapor Retarders: Vapor retarders shall be installed on the warm side (in winter) of insulation as required by this section.

Exception: Vapor retarder installed with not more than 1/3 of the nominal R-value between it and the conditioned space.

1313.2 Roof/Ceiling Assemblies: Roof/ceiling assemblies where the ventilation space above the insulation is less than an average of twelve inches shall be provided with a vapor retarder. Roof/ceiling assemblies without a vented airspace, where neither the roof deck nor the roof structure are made of wood, shall provide a continuous vapor retarder with taped seams.

Exception: Vapor retarders need not be provided where all of the insulation is installed between the roof membrane and the structural roof deck.

1313.3 Walls: Walls separating conditioned space from unconditioned space shall be provided with a vapor retarder.

1313.4 Floors: Floors separating conditioned space from unconditioned space shall be provided with a vapor retarder.

1313.5 Crawl Spaces: A ground cover of six mil (0.006 inch thick) black polyethylene or approved equal shall be laid over the ground within crawl spaces. The ground cover shall be overlapped twelve inches minimum at the joints and shall extend to the foundation wall.

Exception: The ground cover may be omitted in crawl spaces if the crawl space has a concrete slab floor with a minimum thickness of three and one-half inches.

1314 Air Leakage

1314.1 Building Envelope: The requirements of this section shall apply to building elements separating conditioned from unconditioned spaces. Exterior joints around windows and door frames, openings between walls and foundation, between walls and roof and wall panels; openings at penetrations of utility services through walls, floors, and roofs; and all other openings in the building envelope shall be sealed, caulked, gasketed, or weatherstripped to limit air leakage.

1314.2 Glazing and Doors: Doors and operable glazing separating conditioned from unconditioned space shall be weatherstripped. Fixed windows shall be tight fitting with glass retained by stops with sealant or caulking all around.

Exception: Openings that are required to be fire resistant.

1314.3 Building Assemblies Used as Ducts or Plenums:

Building assemblies used as ducts or plenums shall be sealed, caulked, and gasketed to limit air leakage.